

PATENT APPLICATION
HP FILE NO. 10001746

APPLICATION FOR UNITED STATES LETTERS PATENT

For

SCALABLE AND PORTABLE DISC PLAYER
FOR VARIOUS OPTICAL DISC SIZES

By

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EXPRESS MAIL MAILING LABEL
NUMBER **EL442080164US**
DATE OF DEPOSIT **10/27/00**

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2 **SCALABLE AND PORTABLE DISC PLAYER**

3 **FOR VARIOUS OPTICAL DISC SIZES**

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5 **BACKGROUND OF THE INVENTION**

6 1. FIELD OF THE INVENTION

7 This invention relates generally to an optical disc player and more specifically to a

8 portable disc player/recorder that provides a scalable casing for containing various disc sizes.

9

10 2. BACKGROUND OF THE INVENTION

11 Today, most electronic data, whether it is audio, video or computer, is stored and

12 transferred via an optical disc, such as a compact disc (CD”) or a Digital Versatile Disc

13 (“DVD”). With this growing use of the optical disc, many portable disc players for reading these

14 discs have been developed.

15 In general, a portable disc player or recorder may be a peripheral component of a laptop

16 computer or a stand alone portable device that can be carried in the palm of a user’s hand. With

17 either type, the player will provide a casing for containing a data transfer device (“DTD”) having

18 various conventional mechanisms that allow the player to read and/or write data to and/or from

19 the disc. At a minimum, the DTD will include a conventional optical pickup unit (“OPU”)

20 having a sled motor, a spindle motor, and an actuator or voice coil; and general electronics for

21 encoding, decoding and transferring the signal obtained from the optical disc by the OPU to at

22 least one input/output (“I/O”) port. The I/O ports are also conventional and may be used to

23 couple the signal to anything from a processor to a set of headphones. In some instances, the

1 DTD may also include a processor for translating the audio, video or computer signal.

2 The casing of each optical disc player will also include a mechanism for inserting the
3 optical disc. One of the most common mechanisms of a laptop for handling the insertion and
4 removal of a CD and/or DVD utilizes a tray. The tray is typically activated by the user and
5 requires the operation of various mechanical parts. Another mechanism allows the user to
6 position the CD and/or DVD into a slot in the front of the drive. With either of these
7 mechanisms, the positioned disc must be picked up at some point in the insertion process and
8 positioned on a motor spindle of the OPU for subsequent reading and writing operations. When
9 ejection of the CD is desired, the same mechanism removes the CD from the motor spindle and
10 ejects it to some position that resides partially outside of the drive so that the operator can grasp
11 the disc.

12 Although some portable hand-held disc players may use the above mechanism to insert
13 and remove a disc, most stand alone disc players utilize the casing. More specifically, the casing
14 in most stand alone disc players, such as a CD player, provides a top portion that is hinged to the
15 bottom portion. Therefore, by using a common latch system, the top portion of the casing can be
16 secured to the bottom portion to contain a disc, and opened to remove or insert a disc. As with
17 the laptop mechanisms, the disc would be secured to the motor spindle of the OPU during the
18 insertion process.

19 Other elements that are typically associated with a portable disc player include a power
20 source or plug, LEDs for displaying operational conditions, at least one operational button and a
21 central processing unit. Obviously, the stand alone disc player may have numerous buttons to
22 accommodate the various operations of the player and may provide a LCD for displaying the
23 progress of the player while operating. Some of the buttons could be used for operations

1 selected from the group including play, stop, skip, volume, forward, rewind, and pause. General
2 directional arrows may also be employed for menu options provided by a processing unit.

3 When the above portable disc players are designed to accommodate both 80 and 120 mm
4 discs, the size of the casing is always larger than a 120 mm disc. Consequently, when an 80 mm
5 disc is positioned within a disc player that can accommodate both 80 and 120 mm discs, the size
6 of the disc player will not change. Since a 120 mm CD or DVD provides nearly twice the
7 surface area as a 80 mm CD, a player that only accommodates an 80 mm disc will have a much
8 smaller casing and therefore will be much easier to carry and stow. However, such a device can
9 only be used for a 80 mm disc.

10 Although most audio, video and computer data is sold today on a 120 mm disc, the future
11 of optical disc technology is moving toward the much smaller 80 mm disc. Therefore, it would
12 be desirable to have a single portable disc player that could be structurally scaled to
13 accommodate a representative size of the disc it accepts. The present invention is directed to
14 overcoming the above problems associated with conventional disc drives.

SUMMARY OF THE INVENTION

In general, the present invention provides a disc player, with optional recording capabilities, that can accommodate various optical disc sizes. The case for the disc player includes a top and bottom shell and a scalable mechanism. The shells pivotally couple together and interact to form a cavity for containing the disc. The scalable mechanism provides a set of wings and sleeves that pivot and slide, respectively, while being coupled to the top and bottom shells, to change the structural size of the disc player. The disc player casing also includes an data transfer device ("DTD") that attaches to the bottom shell for transferring data from the disc to a desired I/O port.

In one embodiment, the present invention provides a portable disc player casing that includes a top and bottom shell movably attached to allow the insertion and removal of the disc within a cavity of the casing; an data transfer device ("DTD") attached to the bottom shell for obtaining and transferring data; and a mechanism for accommodating the size of the disc and changing the structural size of the player.

In still another embodiment, a process is provided for reading/writing data to/from an optical disc. The process includes the steps of: opening a disc player casing to expose a cavity and a data transfer device ("DTD"); adjusting the size of the casing to accommodate the size of the disc, securing the disc to the DTD; closing the casing to contain the disc within the cavity; and implementing the DTD to transfer data from the disc to an I/O port, via the DTD.

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2 **BRIEF DESCRIPTION OF THE DRAWINGS**

3 Other aspects and advantages of the invention will become apparent upon reading the
4 following detailed description and upon reference to the drawings, in which:

5 Figure 1 illustrates an isometric view of an optical disc player while containing a 120mm
6 disc in accordance with the invention;

7 Figure 2 illustrates an isometric view of the disc player of Figure 1 while containing a
8 80mm CD;

9 Figure 3 illustrates the disc player of Figure 1 while containing a 120mm disc;

10 Figure 4 illustrates the disc player of Figure 2 while containing a 80mm CD;

11 Figure 5 illustrates an isometric view of the top shell of Figures 1-4;

12 Figure 6 illustrates the disc player of Figure 3 with the top shell removed;

13 Figure 7 illustrates the disc player of Figure 4 with the top shell removed; and

14 Figure 8 illustrates an isometric view of the optical pickup unit of Figures 1-4.

15 While the invention is susceptible to various modifications and alternative forms, specific
16 embodiments thereof have been shown by way of example in the drawings and are herein
17 described in detail. It should be understood, however, that the description herein of specific
18 embodiments is not intended to limit the invention to the particular forms disclosed, but on the
19 contrary, the intention is to cover all modifications, equivalents, and alternatives falling within
20 the spirit and scope of the invention as defined by the appended claims.

DETAILED DESCRIPTION OF THE INVENTION

Illustrative embodiments of the invention are described below. In the interest of clarity, not all features of an actual implementation are described in this specification. It will of course be appreciated that in the development of any such actual embodiment, numerous implementation-specific decisions must be made to achieve the developers' specific goals, such as compliance with system-related and business-related constraints, which will vary from one implementation to another. Moreover, it will be appreciated that such a development effort might be complex and time-consuming, but would nevertheless be a routine undertaking for those of ordinary skill in the art having the benefit of this disclosure.

Turning now to the drawings, Figures 1 and 2 illustrate the inventive optical disc player 10 in an open position providing a first and second structural configuration for containing a 120mm CD or DVD 30 and a 80mm CD 32, respectively. The disc player 10 includes a top and bottom shell or cover 12 and 22, a top and bottom sleeve or tray 14 and 24, a top and bottom set or pair of wings 16, 18 and 26, 28, and a data transfer device ("DTD") 40. As will be discussed in more detail, the top and bottom set of wings 16, 18 and 26, 28 include a respective flange 16A, 18A and 26A and 28A, and the top and bottom sleeves 14 and 24 provide a respective flange 14A and 24A. The DTD 40 connects to the bottom shell 22 to receive the CD or DVD within the casing of the disc player 10 and provides conventional mechanisms as described in the background of the invention for obtaining and/or providing data to and/or from a CD or DVD being contained by the disc player while operating.

In a preferred embodiment, the DTD 40 can be connected to a compatible processing unit (not shown) by a known data cable and conventional I/O ports. The I/O port(s) (not shown)

1 would be coupled between the DTD 40 and an exterior surface of the disc player 10. As an
2 example, the data cable for connecting the DTD 40 to a processing unit may be selected from the
3 group including serial, parallel, USB and the like. In addition, the top shell 14 would include a
4 conventional LCD display and operational buttons (neither shown) for controlling the operation
5 of the disc player. The operational buttons could be used for operations selected from the group
6 including play, stop, skip, volume, forward, rewind, and pause. General directional arrows may
7 also be employed for menu options. In an alternative embodiment, the skilled artisan should
8 appreciate that the processing unit could be incorporated as a part of the DTD 40 to assist with
9 operational functions of the disc player and associated buttons and LCD.

10 Figures 3 and 4 illustrate the same disc player 10 of Figures 1 and 2 having the first and
11 second structural position. However, with these illustrations the top shell 12 is in a fully closed
12 position to secure the disc within the casing cavity. In addition, Figures 3 and 4 show the sleeves
13 14, 24 and wings 16, 18, 26, 28 in a fully expanded position to contain the 120 mm disc and in a
14 fully contracted position to contain the 80 mm optical disc, respectively. In the closed position,
15 flanges 16A and 18A of the top set of wings 16 and 18 interact with flanges 26A and 28A of the
16 bottom set of wings 26 and 28 to enclose and protect the optical disc adjacent a right and left side
17 of the disc player 10. In addition, flanges 14A and 24A of the top and bottom sleeves 14 and 24
18 interact with one another to enclose and protect the CD and DVD adjacent a front portion of the
19 disc player 10. In particular, the sleeves 14 and 24 and wings 16, 18 and 26, 28 expand to
20 closely surround and protect the 120 mm CD or DVD of Figure 1; and the sleeves 14, 24 and
21 wings 16, 18 and 26, 28 contract to closely surround and protect the 80 mm CD of Figure 2.

22 Now that the basic components of the inventive disc player have been described, Figures
23 5-8 will layout the functional elements of each component and how they operate together to

1 receive and contain a CD or DVD for data transfer operations. In particular, Figure 5 illustrates
2 the top shell 12 of the disc player 10 after being removed from the disc player of Figures 1-4.
3 Figures 6 and 7 illustrate the disc player 10 without the top shell 12 of FIG. 5, and Figure 8
4 illustrates a conventional DTD 40 as shown in Figures 1-2 and 6-7.

5 Before the detailed description for each element of the shell is disclosed, it should be
6 noted that the top sleeve 14 and set of wings 16 and 18 provide a mirror image of the bottom
7 sleeve 24 and set of wings 26 and 28 for all functional aspects and structure. Similarly, the top
8 shell 12 provides the same functional aspects as the bottom shell 22 for the purposes of the
9 present invention. Therefore, any element of the top shell that would not be mirrored on the
10 bottom shell, such as additional mounting post for the DTD 40 on the bottom shell, a
11 conventional LCD, operational buttons and accommodating circuitry for the top shell, and
12 conventional latch system components attached to the top and bottom shell, would be
13 contemplated by the present invention to other known concepts associated with disc player.

14 Turning to Figure 5, the top shell 12 includes two mounting posts 50 and a wall 12A. The
15 two mounting posts 50 reside near a back region of the disc player 10 to receive complementing
16 holes 56 of each set of wing 16, 18 and 26, 28 (see Figures 6 and 7). In a preferred embodiment,
17 each hole 56 of a wing surrounds a top portion of a respective post 50 when attached. With this
18 arrangement, the top portion of the post would provide a smaller diameter than the lower portion
19 of the post 56 closest to the surface of the top shell. Therefore, the hole of each wing would rest
20 on a ledge of the respective post while attached. If desired, a securing element (not shown), such
21 as a screw, could also be positioned through the hole 56 and screwed into a reciprocating hole of
22 the post to attach each wing 16, 18, 26, and 28 to each respective mounting post 50.

23 The wall 12A for the top shell 12 can be divided into three sections: a back section 12A'

1 and two side sections 12A''. As illustrated, the back section 12A' extends the entire length of a
2 back region and along a portion of a side region of the disc player 10. Each side section 12A''
3 extends from the back section 12A', adjacent the side region, to a predefined region near the
4 front side of the disc player as illustrated. The distance of the side sections 12'' will allow any
5 portion of a CD being contained by the disc player 10 to extend out of the shell for the wings and
6 sleeve to protect. In general, the difference in height between the wall sections 12A' and 12A''
7 will be greater than the thickness of the CD or DVD and the wings.

8 As noted above, the bottom shell 22 is very similar to the top shell 12. In particular, the
9 bottom shell 12 provides two mounting posts (not shown) adjacent a back region of the shell 10
10 that complements the posts 50 of the top shell 12. However, the wall 22A for the bottom shell
11 22 provides only one height that surrounds the entire parameter of the surface, and the height for
12 the bottom shell wall is greater than the height of the DTD 40 as illustrated in Figure 8.

13 Before the top or bottom wings 16, 18 and 26, 28 can be attached to their respective
14 mounting posts 50, the DTD 40 of Figure 8 should be attached to the bottom shell 22 of the disc
15 player 10 as illustrated in Figures 1 and 2. The DTD 40 can be secured to the bottom shell 22 by
16 a conventional means such as screws, glue or rivets using the securing arms 46A, 46B and 46C
17 illustrated in Figure 8. The DTD 40 also secures a disc 30, 32 within the disc player 10 by a
18 conventional securing platter 48. Besides the securing platter 48, the DTD 40 also includes the
19 various conventional mechanisms (not shown) selected from the group including an optical
20 pickup unit ("OPU") having a motor spindle, a sled motor, an actuator or voice coil, and a power
21 source; and general electronics for encoding, decoding, and transferring the signal obtained from
22 the optical disc to an input/output ("I/O") port, via the OPU. The I/O ports may be connected to a
23 processor and will typically be specifically designed for the type of electronic data that the player

1 will read or write, whether it is audio, video or computer. Therefore, the inventive disc player
2 may also provide the associated I/O ports to accommodate the transfer of audio, video and
3 computer data to the appropriate device for using the same. In addition, the power source could
4 be a conventional battery pack structure integrated within the bottom shell of the disc player, a
5 power cord, or both, using a conventional technique.

6 Other elements that are typically associated with a portable disc player, but are not
7 shown, include LEDs or a LCD for displaying operational conditions, at least one operational
8 button, a speaker, and possibly a processing unit. In a preferred embodiment, the disc player of
9 the present invention would include numerous buttons to accommodate the various operations of
10 the disc player and a LCD for displaying the progress of the player while operating. The LCD
11 and operational buttons could be conventionally mounted on a front region of the disc player 10.
12 The buttons would be used for operations selected from the group including play, stop, skip,
13 volume, forward, rewind, pause, and general directional arrows for menu options provided a
14 processing unit, if used.

15 Once the DTD 40 is secured in place, the top and bottom sleeves 14 and 24 should be
16 positioned between the respective shell 12 and 14 and set of wings 16, 18 and 26, 28. Looking
17 again at Figures 5 and 6, the top sleeve 14 clearly shows a groove 60 adjacent each back corner
18 region of the disc player 10 for receiving a complementing pin 62 on each wing 16, 18 and 26
19 and 28. With the pin 62 positioned within the complementing groove 60 of a wing, the wing can
20 be pivotally attached to the shell by the mounting posts 50 as described above. Once each set of
21 wings is attached to their respective posts 50, a user can pull and push on the top and bottom
22 sleeve 14, 24 to create an area large enough for receiving and containing a CD or DVD having a
23 diameter of various sizes.

1 In other words, the inventive disc player 10 can provide a first dimensional size when
2 carrying a 120 mm optical disc as illustrated in Figures 1, 3 and 5 and a second dimensional size
3 when carrying a 80mm optical disc as illustrated in Figures 2, 4 and 6. In particular, the disc
4 player 10 provides a structural size that is slightly bigger than the dimensions of the CD or DVD
5 it contains. Therefore, the inventive disc player can be scaled to be smaller then conventional
6 disc players for carrying an 80 mm CD. A skilled artisan should appreciate that the inventive
7 disc player is not limited to the dimensions of a 80mm and 120mm optical disc, and therefore
8 could be modified to accommodate optical discs that may be smaller, larger and thicker then a
9 conventional CD or DVD.

10 In a preferred embodiment, the top shell 12 is at least partially transparent or translucent
11 so that the user can read labels or other identification on a contained CD or DVD. In addition,
12 the shells 12 and 22, the sleeves 14 and 24, and the set of wings 16, 18 and 26, 28 are preferably
13 made from a material such as plastic. A conventional hinge system couples the top shell to the
14 bottom shell using the back wall sections of disc player. In addition, a common latch system is
15 also used to allow the front region of the top shell to secure to the front region of the bottom
16 shell. Therefore, a top shell can be opened to remove or insert a disc (see FIGs. 1 and 2) and
17 closed to secure an optical disc within the disc player (see FIGs 3 and 4).

18 Now that the structural components of the present invention have been described and
19 their function, the process for using the same will follow. Generally, the process includes the
20 steps of: opening a disc player to expose a cavity and an optical pickup mechanism ("DTD");
21 adjusting the size of the disc player for securing an optical disc to the DTD; closing the disc
22 player to contain the disc within the cavity; and implementing the DTD to transfer data from the
23 disc to an output terminal. As mentioned above, the I/O port could be used to couple speaks to

1 the disc player to hear audio data, or to couple a video display to the disc player to view video
2 data, or to couple a personal computer to the disc player to view video and computer data or
3 listen to audio data contained on a disc.

4 With the inventive disc player, the process step for adjusting the disc player size involves
5 a user slidably moving a sleeve 14, 18 or pivotally moving one or both of the wings on the top
6 and bottom shell of the disc player until the size of the optical disc to be inserted into the disc
7 player will fit into the cavity of the disc player and the protective area created by the wings and
8 sleeves. Consequently, while the inventive disc player is adjusted to accommodate a 120mm or a
9 80mm CD, the overall size is scaled as well.

10 In summary, the present invention provides a protective disc player for an optical disc.
11 The disc player is scalable to accommodate 120mm CDs and DVDs or 80mm CDs. When used
12 for a 80mm CD, the size of the disc player is small enough to be placed in a typical shirt pocket.
13 A disc may remain in the disc player during transport, and for operational purposes, the disc
14 player can be coupled to a computer, speakers, and a video screen, such as a TV or CRT, when
15 desired. Preferably, the disc player is at least partially transparent or translucent, so that labels or
16 other identification on a data storage medium can be read when a data storage medium is present
17 in the disc player.